



## Features

- Digital measurement value processing incl. temperature compensation
- Internal functional control with integrated Hardware Watchdog
- Data / measured values in  $\mu\text{C}$  Sensor, therefore simple exchange of sensor uncalibrated <-> calibrated
- Software according to SIL2 compliant development process
- Modular technology (plug-in and replaceable)
- Easy maintenance and calibration by exchange of the sensor cartridge or by comfortable on-site calibration
- Serial RS 485 interface with protocol for CGD06.

| Technical Data                             | Sensor Board                                                                                                                                                                                                                                           |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Electrical</b>                          |                                                                                                                                                                                                                                                        |
| <b>Power supply</b>                        | 16 – 29Vdc, reverse-polarity protected                                                                                                                                                                                                                 |
| <b>Power consumption</b>                   | 100mA (2.4 VA), 24Vdc                                                                                                                                                                                                                                  |
| <b>Output for GDG bus</b>                  | 5Vdc, 250mA max.<br>Overload, short circuit and reverse polarity protected                                                                                                                                                                             |
| <b>Analog input signal</b>                 | 4 -20mA, overload and short-circuit proof, input resistance 200 $\Omega$                                                                                                                                                                               |
| <b>Voltage for external analog sensors</b> | 24 Vdc, max. 100 mA                                                                                                                                                                                                                                    |
| <b>Digital input signal</b>                | Potential-free contact                                                                                                                                                                                                                                 |
| <b>Function</b>                            | Acknowledge or test function                                                                                                                                                                                                                           |
| <b>Analog output signal</b>                | Proportional, overload and short-circuit proof, load $\leq$ 500 Ohm<br><br><b>4-20 mA or 2-10V</b> = meas. range<br><b>3.2 &lt;4 mA</b> = underrange<br><b>&gt;20- 21.6 mA</b> = overrange<br><b>2.5 mA</b> = fault<br><b>&gt;21.8 mA</b> = fault high |
| <b>Output for local bus</b>                | 5 Vdc, 250 mA max. Overload, short-circuit and reverse-polarity protected"                                                                                                                                                                             |
| <b>Temperature range</b>                   | -35°C to +50 °C (-31 °F to 122 °F)                                                                                                                                                                                                                     |
| <b>Humidity range</b>                      | 15 - 95 % r.H non-condensing                                                                                                                                                                                                                           |
| <b>Storage time</b>                        | 6 months                                                                                                                                                                                                                                               |
| <b>GCD bus interface</b>                   | 1-wire / 19200 Baud                                                                                                                                                                                                                                    |
| <b>ModBus interface</b>                    | RS 485 / 19200 Baud                                                                                                                                                                                                                                    |
| <b>Tool bus interface</b>                  | 2-wire / 19200 Baud                                                                                                                                                                                                                                    |
| <b>Mounting Height</b>                     | <b>1.5 - 1.8 m above floor</b>                                                                                                                                                                                                                         |
| <b>Protection class</b>                    | IP 65                                                                                                                                                                                                                                                  |
| <b>Wire connection:</b>                    |                                                                                                                                                                                                                                                        |
| Field bus                                  | Screw-type terminal min. 0.25 mm <sup>2</sup> , max. 2.5 mm <sup>2</sup>                                                                                                                                                                               |
| Local bus                                  | 3-pin connector                                                                                                                                                                                                                                        |

## Application

The Combi Detector is used as a stand-alone unit with its relay outputs or alternatively with its analog output signal.

It is also used as a two-wire connection and contact anywhere in the building network.

## Design Features

Sensor board with RS 485 interface, 4 – 20 mA output and further options for integration of the sensor and/or for connection of analog sensors.

The Combi Detector provides the power supply of the sensor and makes the measured data available for digital communication and for the 4 to 20 mA output.

Communication with the CGD06 controller takes place via the RS 485 field bus interface with CGD06 protocol.

The optional alarm relays can be controlled both via the CGD 06 controller and locally via the measurement signals.

The digital input for acknowledgment or test function and other options such as various communication protocols for direct connection to superordinate BMS ensure the adaptation to the wide range of applications in gas detection technology.

The sensor is connected to the local bus via a plug connection enabling simple SC exchange instead of an on-site calibration.

The internal X-Change routine recognizes the exchanged sensor after the exchanging process and starts the measurement mode automatically.

An LED indicates the correct procedure of the exchange operation. As an alternative, the on-site calibration via the CGD06 Service Tool can be used with the integrated, comfortable calibration routine.

**Ordering Codes on next page**



# Carbon Monoxide, Toxic gas Combi Detector - Analog, ModBus, Stand-Alone CCO

May. 16

|                                   |                                                                                                                             |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Directives</b>                 | EMC directives 2004/108/EC CE<br>Conformity to: EN 50271<br>EN 61010-1:2010<br>ANSI/UL 61010-1<br>CAN/CSA-C22.2 No. 61010-1 |
| <b>Options</b>                    |                                                                                                                             |
| <b>Power relays (3)</b>           | 250 Vac, 5A, potential-free,<br>change-over contact (SPDT)                                                                  |
| <b>Modbus protocol RTU RS-485</b> | Transmission of current measured<br>values & alarm stages                                                                   |

## Ordering Codes

|                 |                        |                                   |
|-----------------|------------------------|-----------------------------------|
| <b>CCO 100C</b> | CGD bus                | 0-100 ppm 16-29Vdc                |
| <b>CCO 100M</b> | ModBus                 | 0-100 ppm 16-29Vdc                |
| <b>XCO 100</b>  | Sensor<br>Head         | 0-100 ppm for exchange ( 6-years) |
| <b>CCO 250M</b> | ModBus                 | 0-250 ppm 16-29Vdc                |
| <b>CCO 250C</b> | CGD-bus                | 0-250 ppm 16-29Vdc                |
| <b>XCO 250</b>  | Sensor<br>Head (Repl.) | 0-250 ppm for exchange (6 years)  |

| Technical Data                           | Sensor                                                 |
|------------------------------------------|--------------------------------------------------------|
| <b>Electrical</b>                        |                                                        |
| <b>Power supply</b>                      | 5 Vdc from sensor board, reverse<br>polarity protected |
| <b>Power consumption:</b>                | 50 mA, max. (1.0 VA)                                   |
| <b>Serial interface local bus</b>        | 1-wire / 19200 Baud                                    |
| <b>Sensor element</b>                    | Electrochemical                                        |
| <b>Measuring range</b>                   | 0 – 100, 0 - 250, 0 - 300 ppm                          |
| <b>Accuracy</b>                          | ± 3 ppm                                                |
| <b>Resolution</b>                        | 0.5 ppm                                                |
| <b>Repeatability</b>                     | < ± 5 % sig.                                           |
| <b>Response time <math>t_{90}</math></b> | ≤50 sec.                                               |
| <b>Zero point variation</b>              | ± 4 ppm                                                |
| <b>Zero Drift</b>                        | < 0.4 % signal / month                                 |
| <b>Zero Gain</b>                         | < 0.4 % signal / month                                 |
| <b>Pressure range</b>                    | Atmospheric ± 20 %                                     |
| <b>Sensor life time</b>                  | 6 years / normal ambient<br>conditions                 |
| <b>Calibration interval<sup>1</sup></b>  | 12 months                                              |
| <b>Storage temperature<br/>range</b>     | + 5 to + 30 °C (41 to 86 °F)                           |
| <b>Warranty</b>                          | 1 year on material (without sensor<br>element)         |

|                 |                                                                                          |                                  |
|-----------------|------------------------------------------------------------------------------------------|----------------------------------|
| <b>CC= 300M</b> | ModBus                                                                                   | 0-300 ppm 16-29Vdc               |
| <b>CCO 300C</b> | CGD-bus                                                                                  | 0-300 ppm 16-29Vdc               |
| <b>XCO 300</b>  | Sensor<br>Head (Repl.)                                                                   | 0-300 ppm for exchange (6 years) |
| <b>CPS 230</b>  | Power Supply 230V                                                                        |                                  |
| <b>CRELCO</b>   | 3 relay outputs for different alarm levels,<br>standard 20/25/50 ppm (0-100 ppm version) |                                  |
| <b>CSTOP</b>    | Reset button with external input, incorporated<br>in detector                            |                                  |
| <b>CBUZ LED</b> | Buzzer with built-in LED indication in three<br>colours, incorporated in detector        |                                  |
| <b>CDUCT</b>    | Duct Kit                                                                                 |                                  |
| <b>DR 24/30</b> | Power supply 24Vdc                                                                       |                                  |
| <b>CSTAIN</b>   | Option, stainless housing                                                                |                                  |
| <b>REG</b>      | Pressure regulator, flow adjustment to 0.5 l/min                                         |                                  |
| <b>GAS</b>      | Calibration Gas 17 liters                                                                |                                  |
| <b>GKIT</b>     | Calibration Kit                                                                          |                                  |

## Alarm Units

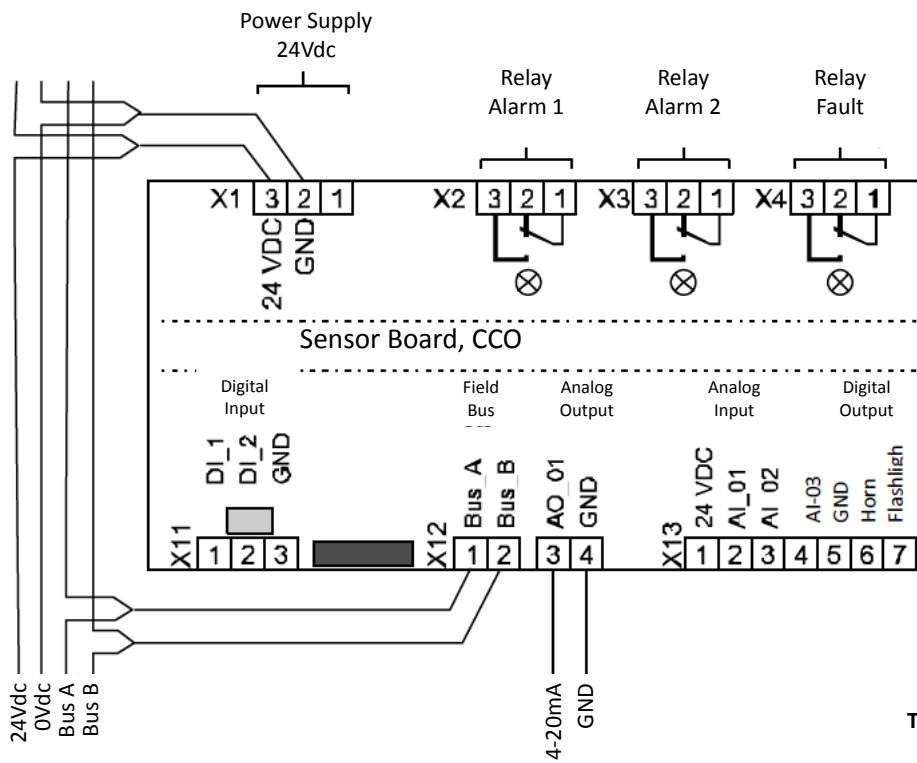
|                |                                                                   |
|----------------|-------------------------------------------------------------------|
| <b>AAW 24</b>  | Warning Horn 24Vdc 98dB                                           |
| <b>AAW 230</b> | Warning Horn 230Vac 98dB                                          |
| <b>OA 24</b>   | Flashlight 24Vdc, red                                             |
| <b>OAW 24</b>  | Combined Warning Horn/Flashlight, 24Vdc 98dB                      |
| <b>OAW 230</b> | Combined Warning Horn/Flashlight, 230Vac<br>98dB                  |
| <b>OAW 24T</b> | Combined Warning Horn/Flashlight with reset<br>button, 24Vdc 98dB |

## Warning Plate

|                  |                                              |
|------------------|----------------------------------------------|
| <b>Gas Alarm</b> | Flashing gas alarm plate "GASALARM" 24Vac/dc |
| <b>SP 600</b>    | Impact protection                            |

<sup>1</sup> Manufacturer-recommended calibration interval for normal environmental conditions.

**Electrical Connection**



**Table: Connection options for sensors**

| Connection | Sensors via local bus | Analog sensors with 4-20 mA signal |
|------------|-----------------------|------------------------------------|
| Number     | 0                     | 1 - 3                              |
| Number     | 1                     | 0 - 2                              |
| Number     | 2                     | 0 - 1                              |

**Field Bus**

## Gas monitoring and ventilation control in parking areas

Gas monitoring in parking areas meets two main needs:

- To give a warning when the amount of harmful gases reaches an unhealthy level.
- To ensure that the ventilation control is done in the best and most profitable way, ie for fresh air needs.

### Hazardous gases

Petrol and diesel exhaust fumes emit harmful levels of nitrogen dioxides (NO<sub>2</sub>), hydrocarbons (CH) and carbon monoxides (CO).

As a rule only carbon monoxides and nitrogen dioxides are monitored in parking areas since it is often (wrongly) believed that other gases do not reach harmful levels.

Carbon monoxide is a highly dangerous toxic gas (see table at the top of page 5).

Nitrogen dioxide is a carcinogen.

When considering monoxide from gas monitoring perspective it is appropriate to have two alarm levels, where one level, occurs at about 20 ppm, and the other at about 35 ppm.

A gas alert sign or similar can warn of unhealthy carbon monoxide levels at the lower alert level. At the higher alert level, ie critical alarm level, it may be appropriate to allow the system to activate a warning siren.

A detector density of at least 1 detector/400 m<sup>2</sup> is would be appropriate.

In case there are diesel vehicles in the parking area, it is important to take other harmful gases into consideration, such as nitrogen oxides and hydrocarbons.

In cases described above, specific monoxide detectors cannot cover the detection needs. Detectors that can detect these gases are required, eg, the GNO<sub>2</sub> gas detector.

### Application areas

- Car repair shops
- Trucks/Indoor
- Parking areas
- Tunnels
- Mines
- Ice Hockey Rinks
- Bus/Lorry Terminals
- Generator rooms
- Garages

### Ventilation control

The minimum requirement to be set in ventilation control is to make certain that the gas monitoring facility affects the ventilation in such a way that if harmful gas concentrations occur, the fresh air intakes must increase in order to reduce gas concentrations to reach harmless levels.

A well-regulated demand controlled ventilation in a parking area not only improves the air quality but it also minimizes the energy consumption by avoiding unnecessary ventilation.

Optimal ventilation with regard to gas concentrations can usually be

achieved by regular ventilation.

In a modern gas monitoring facility there are functions both for alarms (two levels) and controls for air evacuation.

The control options in the gas monitoring facility can be adapted to the control modes of most ventilation facilities.

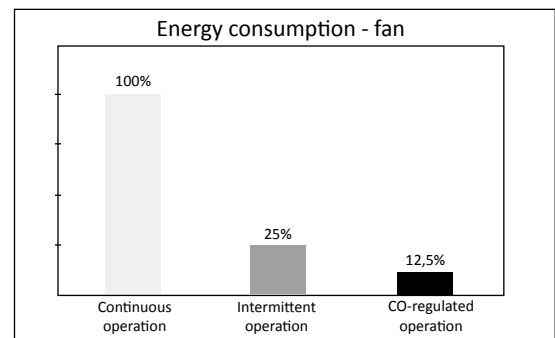
The gas monitoring facility allows for incrementally controlled ventilation.

### Example:

At low load, ventilation is running at 1/2-power. If the gas concentration exceeds 20 ppm (level 1), the sensors react and ventilation is controlled is switched over to the 1/1 power.

Staff Alarm - e.g. warning by sirens in the parking area - is given when the concentration exceeds 25 ppm (level 2).

Stepless control via frequency converter controller or via DDC/PLC gives the best energy savings.



By monitoring CO levels and only running the fans when necessary the CO detector becomes a significant energy saver.

Normally parking area ventilation need only be operational in 2 out of 24 hours, which naturally saves a great deal of energy.

### Poisoning Hazard

There are several gas that when released in the air uncontrolled can poison and kill people. Common poisonous gases in industry are e.g. ammonia, carbon monoxide and hydrogen sulphide (all the examples listed are also flammable).

Experts within occupational health and medicine estimate the gas concentrations for harmful gases when the adverse impacts are minor.

In Sweden, these so called hygienic levels are set and updated by the Swedish Work Environment Authority.

A distinction is made between the maximum exposure limit, i.e. the maximum value for a 15-minute average exposure, and the exposure limit value, i.e. the maximum value for an 8-hour average exposure.

When monitoring gas it is advisable to let the hygienic exposure limit values provide indications for the choice of alarm levels.

This does not mean however that you necessarily need to adhere to the above described levels.

Alarm levels should be chosen according to how dangerous the gas is and the particular installation conditions.

| How carbon monoxide affects people |       |                      |                                             |
|------------------------------------|-------|----------------------|---------------------------------------------|
| Vol-%                              | ppm   | Contact duration     | Symptom med möjliga följder                 |
| 0.02                               | 200   | 2-3 h                | Light headache                              |
| 0.04                               | 400   | 1-2 h                | Severe headache (forehead)                  |
| 0.08                               | 800   | 45 min<br>2 h        | Malfunctions in the body<br>Unconsciousness |
| 0.16                               | 1600  | 20 min<br>2 h        | Malfunctions in the body<br>Death           |
| 0.32                               | 3200  | 5-10 min<br>30 min   | Malfunctions in the body<br>Death           |
| 0.64                               | 6400  | 1-2 min<br>10-15 min | Malfunctions in the body<br>Death           |
| 1.28                               | 12800 | 1-3 min              | Death                                       |

| Emission values for different engine types, as well as hygienic exposure limits of the gases |                                                            |      |    |                             |                             |                 |                       |            |                          |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------|------|----|-----------------------------|-----------------------------|-----------------|-----------------------|------------|--------------------------|
| GAS                                                                                          | Impurities (g/kg fuel) caused by petrol and diesel engines |      |    | ppm content petrol exhausts | ppm content diesel exhausts | Hygienic limits |                       |            |                          |
|                                                                                              |                                                            |      |    |                             |                             | ppm 8 h         | mg/m <sup>3</sup> 8 h | ppm 15 min | mg/m <sup>3</sup> 15 min |
| NO <sub>2</sub>                                                                              | 25                                                         | 10,5 | 42 | 100-200                     | 2000                        | 25              | 30                    | -          | -                        |
| CO                                                                                           | 155                                                        | 12   | 13 | 20000-60000                 | 1000                        | 35              | 39                    | 50         | 55                       |
| CH                                                                                           | 15                                                         | 6    | 4  | 200-1500                    | 500                         | 25-1000         |                       |            |                          |

By using gas detectors with an analog output, 4-20 mA, which sends the signal to a computerized control, regulation and monitoring system, the ventilation control is done in a more refined manner.

Depending on the capacity of the computerized system, the ventilation can be controlled continuously instead of stepwise. One can have a throttle control, optional time delays, breakdown of the ventilation into zones, etc.

| The impact of various gases and vapours on people and hygienic exposure limits.<br>Gas concentration in ppm (parts per million). |                               |                  |                   |               |               |
|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------|-------------------|---------------|---------------|
| Gas                                                                                                                              | Lethal dose 5-10 min duration | Severe poisoning | Temporary trouble | Max exp. lim. | Av. exp. lim. |
| Ammonia (NH <sub>3</sub> )                                                                                                       | 5.000                         | 2.500            | 250               | 50            | 25            |
| Carbon monoxide (CO)                                                                                                             | 7.000                         | 2.000            | 1.000             | 100           | 35            |
| Petrol                                                                                                                           | 20.000                        | 7.500            | 3.000             | -             | 200*          |
| Acetylene                                                                                                                        | 500.000                       | 250.000          | 100.000           | -             | -             |

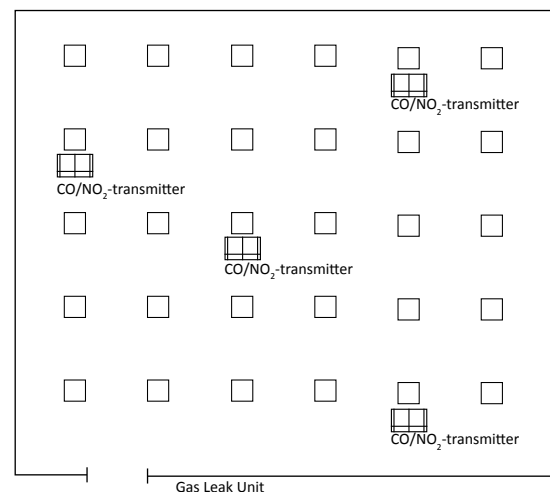
\* Refers to mg/m<sup>3</sup>

### Installation exemple

Installation in parking area with mechanical ventilation at 40 x 40 m (1600m<sup>2</sup>).

The CO-detectors are placed at 140-180 cm above the floor, evenly distributed over the area, with consideration taken for walls and section dividers.

As a rule of thumb there should be one detector per 400m<sup>2</sup>, the exact number depending on the shape of the area.



We cannot be held responsible for errors in the manual/datasheet and reserve the right to correct any errors and to make product improvements, which may affect the accuracy of the manual/datasheet, without prior notice.